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SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

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FRIDAY, FEBRUARY 8, 1901.

THE ENDOWMENT OF RESEARCH.

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Is investigation in the physical sciences now limited by the lack of men or money? In other words, is it limited by the insufficient number of investigators capable and ready to do work of the highest grade, or are they unable to secure the means needed to carry on such work? The income of several funds is available for aiding such investigation. In 1797, Count Rumford gave to the American Academy the sum of \$5,000, for awarding gold and silver medals for discoveries in light and heat. Until recently, so little use has been made of its income that this fund now amounts to \$58,000. The annual income, which exceeds \$2,500, may be used for researches in light and heat. The Elizabeth Thompson fund, amounting to \$26,000, according to the last circular issued, may be used for investigations in all departments of science. Seventy-one grants have been made from the income of this fund, generally in sums not exceeding \$300. Several funds, held in trust by the National Academy of Sciences, show unexpended balances equal to the income of several years. Thus, at the beginning of the present year, the Henry Draper fund of \$6,000 had an unexpended balance of more than \$2,000 available for investigations in astronomical physics, and no applications had been received for it. In 1886, the writer attempted to secure the sum of \$100,000, the income to be used for

a steady growth in every department, which places it in the front rank of Southern institutions and equal, if not ahead, of many of the older colleges of the North. Under the administration of President Prather its work is steadily advancing and it is to be hoped that the Legislature of Texas will see the necessity of an enlarged and ample endowment.

ROBT. T. HILL.

BOOKS OF REFERENCE.

WE have received from Messrs. Lemcke & Buechner, New York, the tenth volume of the invaluable year-book of the learned world, 'Minerva,' which is now a volume of 1,235 pages. The frontispiece is an etching of Professor W. C. Röntgen, the other men of science selected for this purpose in previous volumes having been Pasteur, Kelvin, Schiaparelli and Nansen. The editor has been compelled to give up his plan of including in the work data of international congresses, which is regrettable, though the task of securing such information is doubtless difficult. As it is the work contains a vast mass of information—a rough calculation indicates that the names of about 32,000 scientific and learned men, connected with the world's institutions of learning, are included. The statistics of students given at the end show that the universities having an attendance of over a thousand students are distributed as follows: United States, 26; Germany and Austria, 24; Italy, 10; Great Britain and France, 8 each; Russia, 7; Spain, 4; Norway and Sweden, 3; Switzerland, Belgium and Canada, each 2; Denmark, Portugal, Egypt, Brazil, Chili, Philippines, New Zealand and Japan one each.

'Who's Who' for 1901, published in London by the Blacks, and in New York by the Macmillans, is also a useful work of reference, giving as it does short biographies of the leading men and women of Great Britain and of a few Americans. All the leading British men of science are included, and it is interesting to note how many there are and what important work they have accomplished. It is impossible to discover by what principle or lack of principle the Americans have been selected. The provost of the University of Pennsylvania is

there, but not the president of Harvard University. Mr. Tesla is included, but not the two or three of our most eminent men of science who have been looked up. The editing of the book appears to be careful, but not perfect. Thus to take a somewhat trivial example, Francis Darwin is said to be the son of 'Charles Robert Darwin,' George Howard Darwin is said to be the son of 'the late Charles Robert Darwin (author of the 'Origin of Species,' etc.)' and Leonard Darwin is said to be the son of 'the celebrated Charles Darwin, Down, Kent.' The 12,000 biographies, more or less, which the volume contains are certainly most useful for reference. In this connection it may be stated that a new edition of the American 'Who's Who' is in preparation, and the editor Mr. John W. Leonard, care of A. N. Marquis & Co., Chicago, will be glad to secure corrections and additions to the last edition.

BOOKS RECEIVED.

Practical Electro-chemistry. BERTRAM BLOUNT. New York, The Macmillan Company; London, Archibald Constable & Company. 1901. Pp. xi + 374.

Electricité et Optique. H. POINCARÉ. Paris, Georges Carré and C. Naud. 1901. Pp. ii + 641.

The Bird Book. FANNIE HARDY ECKSTORM. Boston, D. C. Heath & Company. 1901. Pp. xii + 276. \$.60.

Elevation and Stadia Tables. ARTHUR P. DAVIS. New York, John Wiley & Sons; London, Chapman Hall, Limited. 1901. Pp. 43.

Laboratory Instructions in Chemistry. ERNEST A. CONGDON. Philadelphia, P. Blakiston's Son & Company. 1901. Pp. viii + 110.

Studien über den Milchsaft und Schleimsaft der Pflanzen. HANS MOLISCH. Jena, Gustav Fisher. 1901. Pp. viii + 111.

Die Reizleitung und die reizleitenden Strukturen bei den Pflanzen. B. NEMEC. Jena, Gustav Fisher. 1901. Pp. 153. Tafeln 111.

Seventeenth Annual Report of the Bureau of American Ethnology. J. W. POWELL. Washington, Government Printing Office. 1898. Part II. Pp. 752.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *Botanical Gazette* for January, 1901, contains a second contribution by Professor C. S. Sargent, 'On New or Little Known North American Trees.' This special fascicle of descriptions

includes a new honey locust from Texas and eight new species of *Crataegus*. Mr. Theo. Holm contributes an 'Anatomical Study of *Eriocaulon decangulare* L.,' from which he concludes that this genus and its allies are somewhat unique among the monocotyledons. Mr. B. M. Duggar, of Cornell University, records the results of 'Physiological Studies with reference to the Germination of certain Fungous Spores.' The number closes with the usual book reviews, notes for students and news items.

THE February number of *Popular Astronomy* contains an article by R. G. Aitken, of Lick Observatory, on the 'Orbit of Sagittarii,' accompanied by a plate of the orbit; the second part of Mr. How's article on the 'Best Astronomical Books for the Use of Students' takes up historical and biographical works in detail; J. F. Lanneau contributes notes on the eclipse, and Asaph Hall a note on 'Clairaut's theorie de la figure de la terre.' J. K. Rees, of Columbia University Observatory, presents a full report of the observations on the November meteors during the years 1898, 1899 and 1900. An abstract is also given of the article by Kretz on the 'Star Coma Berenices' and a full account of the recent reports of the Board of Visitors of the Naval Observatory. An article by Professor W. W. Campbell shows how the observations of Eros will determine the sun's distance from the earth and a résumé of the scientific progress of the nineteenth century closes the general department of the number. In addition to the usual notes a new department is opened which gives news of 'Double-Stars, their Observations and Observers.'

SOCIETIES AND ACADEMIES.

SCIENCE CLUB OF THE UNIVERSITY OF WISCONSIN.

THE December meeting of the Science Club of the University of Wisconsin was addressed by Dr. C. R. Van Hise on the topic, 'The Earth's Story of the Ore Deposits.' This address, which was delivered to a large audience, treated in a briefer and simpler manner a subject which has recently been given an ex-

haustive treatment in addresses before the American Institute of Mining Engineers and the Western Society of Engineers, and which under the title, 'Some Principles controlling the Deposition of Ores' has been printed in the *Transactions* of the first-mentioned Society. The thoroughness of Professor Van Hise's investigations, which, starting on different lines, have converged upon a common point, set to rest many hitherto controverted questions and, from an application of newly determined principles in the fields of physical chemistry, applied mathematics and soil physics, as well as in geology, there has been evolved a theory of ore deposition which is both logical and in accord with observed facts. The theory may be said to be grounded on two important earlier investigations: one by Van Hise, showing that at the moderate depth of 20,000 meters all save the smallest cavities must close in even the hardest rocks, whereas in most rocks they must close at one-half that depth, and one on Slichter's elaborate investigation of the flow of underground waters, an investigation which has been considerably extended by Van Hise.

From the first-mentioned study it follows that the circulating waters, which it is almost universally admitted deposit the ores from solution, could not have come from below the depth of 20,000 (or perhaps 10,000) meters. The excessive friction of liquids moving in capillary tubes, and the consideration that probably 100,000 times as much liquid as ore must be transported seem to exclude the possibility of ascensional currents below this level, thus restricting their circulation to the thin outer shell of the earth's crust—the *zone of fracture*. This requires that the circulating water shall be of meteoric origin, and the fundamental premise is made that the motion of the waters is a result of gravitative stress.

Water flowing under head from one point to another through a homogeneous medium will utilize the entire cross-section (indefinitely extended), though the major portion will pass by the shortest route. If vertical fissure planes exist in the course of the liquid the lines of flow will be deflected so that above a certain point they will enter the fissure in a downward direction and below another point they will be di-